INCH - POUND

MIL-PRF-20039964(AF)
CAGE Code: 18894
25 September 2003

PERFORMANCE SPECIFICATION FOR THE CYU-1/B 105MM CARTRIDGE CASE

Prepared for:
OO-ALC/WM
Hill AFB, UT 84056

Prepared by:
USAF AIR ARMAMENT CENTER
Armament Product Division
Plans & Programs Division, AAC/WMX
Guns & Ammunition Team
Eglin AFB FL 32542

SUBMITTED BY: _____ Date: 25 Sep 03
Robert G. Campbell, Major, USAF
Program Manager, Guns & Ammo
AAC/WMX

APPROVED FOR USE AS PRODUCT BASELINE BY: _____ Date: 25 Sep 03
John Michael Atnip
Program Manager, Medium Caliber Munitions
OO-ALC/WMBA

AMSC N/A

FSC: 1315

1. SCOPE

1.1 Scope. This specification covers the requirements, examinations and tests for manufacturing the 105mm CYU-1/B Cartridge Case.

1.2 **WARNING to Potential Offerers**. The CYU-1/B Cartridge Case is used to produce the 105mm PGU-44/B HE Cartridge, the 105mm PGU-45/B HF HE Cartridge and the 105mm PGU-43/B Practice Cartridge. Because of operational and Safety requirements, the mouth of the cartridge case is crimped into the rotating band relief groove of the projectile on all three cartridges, creating a fixed cartridge. In order to insure the quality of the crimp, the Air Force requires that the CYU-1/B Cartridge Case be consistently capable of passing the required bullet pull test described herein. **Air Force experience has shown that it is possible to build cartridge cases in accordance with all applicable drawings and specifications that are incapable of consistently passing the test. It is the contractor's responsibility to adjust applicable characteristics within the allowed tolerances in order to insure that the cases will consistently pass said test.** The Air Force specifies the required result (minimum bullet pull force under controlled conditions) of said crimp, not the crimp process. Therefore it is the contractor's responsibility to work with the Load, Assemble, and Pack (LAP) contractor for the cartridges to insure that finished cartridges meet the bullet pull force requirements. More than 30 year's experience in producing various types of 105mm Air Force cartridges with cases from numerous contractors has shown it to be entirely possible to produce cartridge cases to all the other requirements of this specification that will consistently meet the bullet pull force requirement.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are needed to meet the requirements specified in sections 3 and 4 of this specification. This section does not include documents in other sections of this specification or recommended for additional information or as examples. While every effort has been made to assure the completeness of this list, document users are cautioned that they must meet all requirements of the documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government Documents.

2.2.1 Specifications, Standards and Handbooks. The following standards and handbooks below form a part of this document to the extent specified herein.

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-1168 - AMMUNITION LOT NUMBERING AND AMMUNITION DATA CARD

MIL-STD-1916 - DOD PREFERRED METHODS FOR ACCEPTANCE OF PRODUCT

2.2.2 Other Government Documents, Drawings and Publications. The following Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DRAWINGS

USAF AIR ARMAMNENT CENTER (AAC)

PRODUCT DRAWINGS

18894-20039964 - Case, Cartridge, 105MM, CYU-1/B

US ARMY ARMAMENT RESEARCH, DEVELOPMENT AND ENGINEERING CENTER (ARDEC)

INSPECTION EQUIPMENT

19203-7555278 - Gage, Chamber
19203-7258482 - Profile and Alignment Gage

(Copies of specifications, standards, drawings and other Government documents required by contractors in connection with specific acquisition functions should be obtained from the Air Force Program Office (AFPO), OO-ALC/WM, 6033 Elm Lane, Hill AFB, UT 84056-5819)

2.3 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents that are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM-B 154 - Mercurous Nitrate Test for Copper and Copper Alloys

ASTM-E8 - Tension Testing of Metallic Materials

ASTM-E18 - Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

ASTM-E 340 - Macroetching Metals and Alloys

(Application for copies should be addressed to the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

2.4 Order of Precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS. Requirements listed in this section shall be verified as stated in section 4 (see Table 1).

REQUIREMENTS / VERIFICATION CROSS-REFERENCE MATRIX

METHOD OF VERIFICATION

N/A - NOT APPLICABLE
1 - ANALYSIS
2 - DEMONSTRATION
3 - EXAMINATION
4 - TEST

CLASSES OF VERIFICATION

A - DESIGN VERIFICATION
B - FIRST ARTICLE ACCEPTANCE TEST
C - LOT ACCEPTANCE TEST

SECTION 3 REQUIREMENTS	VERIFICATION METHOD					CLASS			SECTION 4 VERIFICATION
	N/A	1	2	3	4	A	B	C	
3.1		X	X	X	X	X	X	X	4.1
3.2	N/A								
3.2.1		X	X	X	X	X	X		4.2.1
3.2.2		X	X	X	X	X		X	4.2.2
3.2.3			X	X	X		X	X	4.2.3
3.2.3.1			X		X	X	X	X	4.2.3.1
3.2.3.2			X		X		X	X	4.2.3.2
3.2.3.3			X	X	X		X	X	4.2.3.3
3.2.3.4			X	X	X		X	X	4.2.3.4
3.2.3.5			X	X	X		X	X	4.2.3.5
3.2.4					X		X	X	4.2.4
3.2.5					X		X	X	4.2.5
3.2.6					X		X	X	4.2.6
3.2.7					X		X	X	4.2.7
3.2.8				X			X	X	4.2.8
3.3	N/A								
3.4				X	X	X			4.4
3.5					X	X			4.5
3.6				X			X	X	4.6

Table 1. Requirements / Verification Matrix

3.1 Cartridge Case. The CYU-1/B Cartridge Case shall comply with all requirements specified on Drawing 20039964, on all associated drawings, and in applicable specifications.

3.2 Acceptance Testing. Unless otherwise specified in the contract, First Article Acceptance Test (FAAT) is required of new vendors or when a break in production exceeding one year occurs. A Lot Acceptance Test (LAT) is required for each production lot unless otherwise specified. The contractor is responsible for the performance of all inspections and tests associated with FAAT & LAT. Unless otherwise specified, crimping, bullet pull testing, and preparation of cartridges for gun testing shall be done by the load, assemble, and pack (LAP) contractor who will be using the cases in cartridge production. Gun testing may be performed at either a Government proving ground or a contractor owned proving ground approved by the Air Force Program Office. The Government reserves the right to perform any of the inspections set forth in this specification. A technical representative from the AFPO shall be invited to witness all acceptance tests.

3.2.1 FAAT. A first article sample shall be produced and subjected to inspection in accordance with 4.2.1. Any production started before all portions of the First Article Acceptance Test (FAAT) are satisfactorily completed is at the contractor's risk. Because Air Force cartridges are fixed (crimped) some portions of the FAAT shall be conducted using crimped cartridges. The first article sample shall consist of 80 cases -- 20 cases to be used to set up the LAP contractor's crimp process, and 60 cases to be subjected to the various inspections and tests that make up the FAAT.

3.2.2 LAT. A random sample of sixty (60) CYU-1/B Cartridge Cases from each lot shall be subjected to inspection in accordance with 4.2.2. Because Air Force cartridges are fixed (crimped) some portions of the LAT shall be conducted using crimped cartridges.

3.2.2.1 Lot Formation. Lot formation shall be in accordance with MIL-STD-1168. Maximum lot size shall be 25,000 cartridge cases.

3.2.3 Gun Test. The CYU-1/B Cartridge Case shall function properly when assembled into a an PGU series cartridge and fired in an M101A1, M102, M119A1, or similar 105mm Howitzer (approved by the USAF Program Office) using standard field loading, firing and extraction procedures (remote firing permitted). A sample of thirty (30) cartridge cases shall be submitted for gun testing for both FAAT and LAT. LAT samples shall be taken as equally as possible from each day's production. These cases shall be assembled with the other components required to build complete cartridges for testing. Prepare the test cartridges as follows:

a. Primer Assembly. Install M28A2 Primer Assemblies in sample cases.

b. Propelling Charge. Adjust the propelling charge to produce the chamber pressure specified on drawing 20039964. Install charge in case.

c. Projectile. Projectiles shall be of the same type to be used in the production for which the cases are intended. They may be filled with either live or inert filler. Assemble with a mass mock (dummy) supplemental charge (if required for the cartridge type) and mass mock (dummy) fuze.

d. Cartridge. Crimp loaded cartridge case to projectile (see 3.2.4 and 4.2.4).

3.2.3.1 Chamber Compatibility. Cartridges made with the CYU-1/B Cartridge Case shall be compatible with the chamber of the gun used for FAAT and LAT.

3.2.3.2 Extraction. After firing, the cartridge case shall be extracted from the chamber by the service extractor used during normal fielded operation.

3.2.3.3 Obturation. (see 6.11) The cartridge case shall effectively seal the chamber and protect the breech of the weapon against gases generated during firing. The fired cartridge case shall show no visual evidence of propellant gas migration beyond the forward most four inches of the exterior of the case after firing.

3.2.3.4 Soundness. The cartridge case shall exhibit the ability to withstand chamber pressure specified in drawing 20039964 without splitting, cracking or breaking-up. There shall be no splits in the sidewall within four in. of the case head. There shall not be more than one split anywhere in the sidewall. Additionally, the cartridge case shall not exhibit any evidence of material loss or burn-through (see 6.11) due to combustion or erosion due to propellant gases.

3.2.3.5 Primer Retention. The cartridge case shall retain its primer assembly during firing and extraction. Additionally, there shall be no evidence of propellant blow-back (see 6.11) or gas leakage between the case and the primer assembly after firing

3.2.4 Bullet Pull Test. All USAF 105mm cartridges are fixed – the mouth of the cartridge case is crimped 360° into the Band Relief Groove of the projectile. The security of the crimp is critical to flight safety, and is dependent on several factors:

a. Band Relief Groove geometry. The Band Relief Groove geometry of the High Frag Projectile, Dwg. 9211610-3 was modified specifically to enhance crimp strength.

b. Cartridge case mouth properties such as wall thickness and hardness.

c. Crimp Machine setup (pressure, dwell, alignment, etc.)

After being crimped to appropriate projectiles, 20 cartridge cases shall be subjected to bullet pull testing IAW 4.2.4 as part of the FAAT and each LAT. The security of the crimp of the cartridge case to the projectile shall be in accordance with the requirements of the appropriate drawing (9926070, 9926071, or 9926072) for the cartridge for which the cases are being produced. There is no requirement for primer assemblies, propelling charges, or fuzes in cartridge assemblies to be pull tested.

3.2.5 Hardness Test. Five (5) cases shall be submitted to this test for FAAT, and five for each LAT. The metal at the locations shown in Figure 1 shall have a Rockwell hardness value of not less than B65.

3.2.6 Tensile Strength Test. Five (5) cases shall be submitted to this test for FAAT, and five for each LAT. Specimens taken from sample cartridge cases in accordance with Figure 2 shall comply with the requirements of Table 2 (see 6.8).

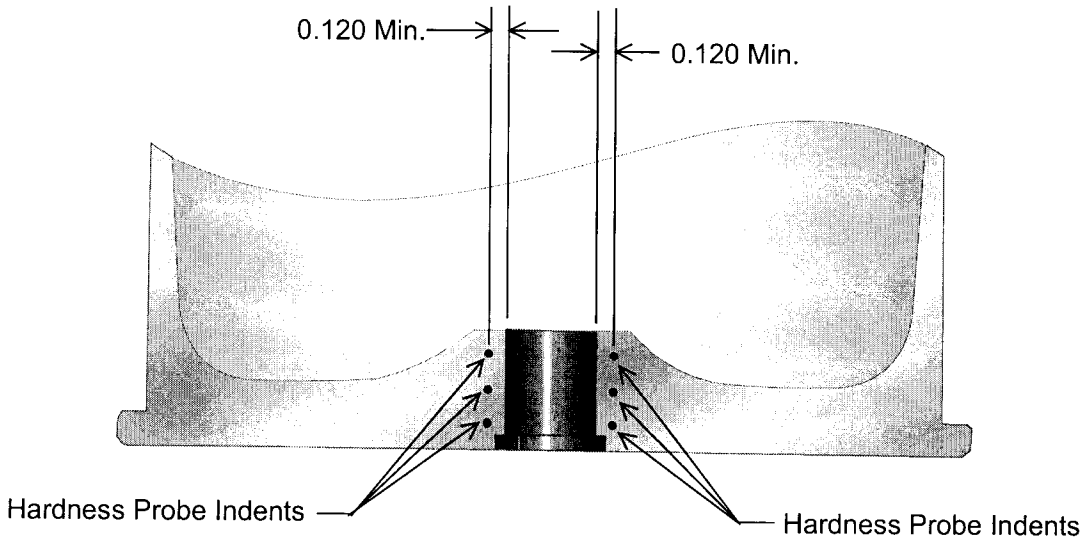

Figure 1. Hardness Test Locations

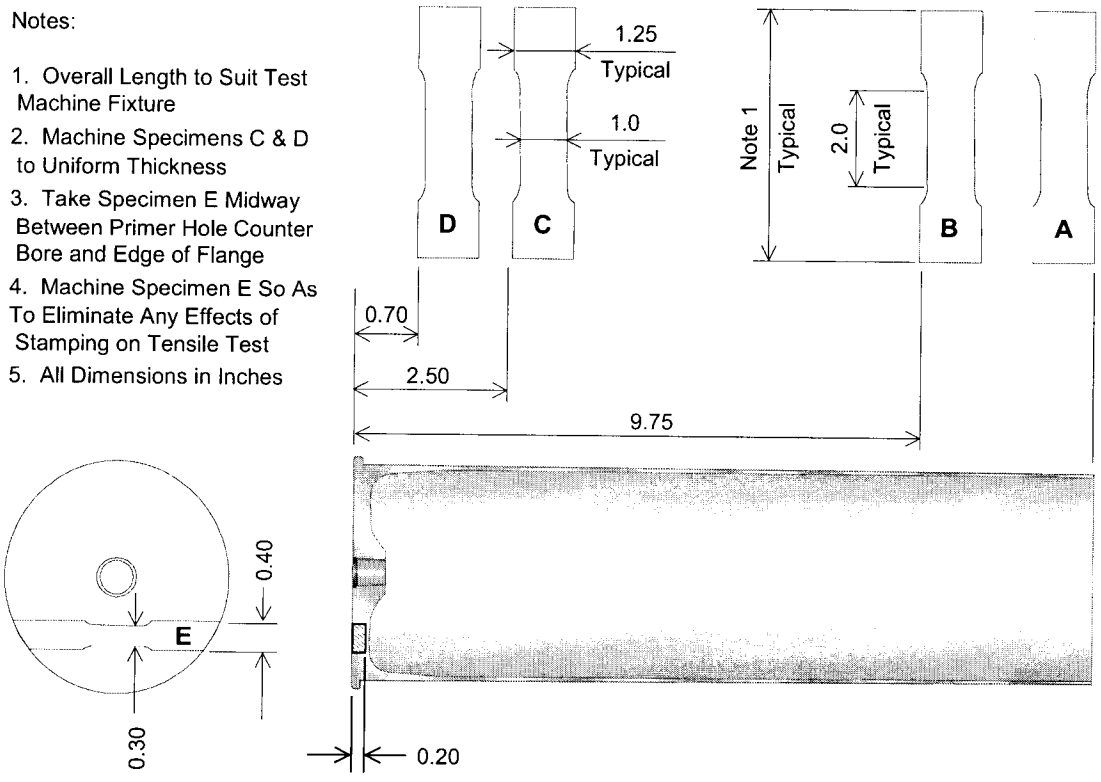

Figure 2. Preparation of Tensile Test Specimens

Specimen	Pounds per Inch^2 (psi)
A	44,000 Minimum, 58,000 Maximum
B	50,000 Minimum
C	65,000 Minimum
D	65,000 Minimum
E	57,000 Minimum

Table 2. Tensile Requirements

3.2.7 Mercurous Nitrate Test. Five (5) cases shall be submitted to this test for FAAT, and five for each LAT. The cartridge case shall show no evidence of cracking within 24 hours after immersion in mercurous nitrate.

3.2.8 Macro Examination. See Figure 3. Five (5) cases shall be submitted to this examination for FAAT, and five for each LAT. The cartridge case shall contain no folds or cold shuts in the radius area except for the crosshatched area enclosed by segment A-B, arc B-C, segment C-D, and arc D-A. Arc D-A being the actual size of the sample case.

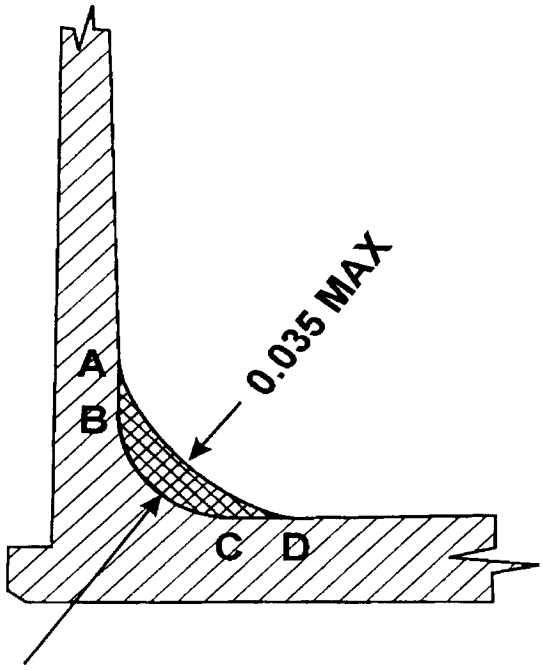

Figure 3. Macro Examination

3.3 Quality Assurance. The contractor shall utilize a quality program or detailed inspection system to provide assurance of compliance of all characteristics with the applicable drawing and specification requirements. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspections. Sampling inspection shall be conducted in accordance with MIL-STD-1916. Methods of inspection include visual, test, and acceptance inspection equipment (AIE) (see 6.11 Definitions).

3.4 Metal Defects. (Critical) The cartridge case shall be free from cracks, blisters, seams, laminations, deep scratches, porosity, splits, inclusions, pipe, and other metal defects deeper than 1/10 of the metal thickness at the defect site. The cartridge case shall be free from folds and cold shuts except as defined in 3.2.8.

3.5 Maximum profile. All cases and finished cartridges shall freely enter the appropriate chamber gage prior to packing and shipping the finished product. (Chamber Gage # 7555278, or a similar one approved by the Air Force Program Office shall be used in case production. The maximum case insertion force into the gage allowed is a dead load of 15 pounds. No part of the base of the cartridge case shall protrude past the rear of the gage. Chamber Gage # 7258482 or a similar one approved by the Air Force Program Office shall be used in cartridge production.

3.6 Workmanship. Cases shall be finished in a thorough, workmanlike manner. Cases shall be free of burrs, chips, sharp edges, cracks, unblended radii, surface defects, dirt, grease, rust, corrosion products and other foreign matter. The cleaning method and/or agents used shall not be injurious to, nor contaminate the case or the environment. All required markings shall be neat and sharply defined.

4. Verification.

4.1 Cartridge Case. The Air Force Program Office may subject FAAT and LAT samples to any or all of the examinations and tests specified in this specification, and may inspect those samples for compliance with any or all requirements of the applicable drawings.

4.2 Acceptance Testing.

4.2.1 FAAT. See Table 3. FAAT will include bullet pull testing, gun testing, macro examination, hardness testing, tensile strength testing, mercurous nitrate testing, and any or all examinations for defects listed in Table 6.

4.2.2 LAT. See Table 3. LAT will include bullet pull testing, gun testing, macro examination, hardness testing, tensile strength testing, mercurous nitrate testing, and any or all examinations for defects listed in Table 6.

4.2.2.1 Rejection. If any assembly, component or test specimen fails to comply with any of the applicable requirements, the sample shall be rejected. The Air Force reserves the right to terminate inspection and reject the lot upon any failure of a cartridge case to comply with any of the requirements.

First Article & Lot Acceptance Tests					
Examination or Test	**Quantity**	**Fail***		**Requirement**	**Verification**
		A*	**R***		
Hardness	5**	0	1	3.2.5	4.2.5
Tensile Strength	5**	0	1	3.2.6	4.2.6
Mercurous Nitrate Test	5	0	1	3.2.7	4.2.7
Macro Examination	5**	0	1	3.2.8	4.2.8
Bullet Pull Test	20	0	1	3.2.4	4.2.4
Gun Test	30	0	1	3.2.3	4.2.3
Totals	**60**	**0**	**1**		
* Fail = Failure, A = Accept, R = Reject ** Hardness, Tensile Strength, and Macro Examination Samples All Taken from Same 5 Cases					

Table 3. FAAT & LAT

4.2.3 Gun Test. (see Table 4) The gun test shall be conducted at a facility approved by the Air Force Program Office. The cartridges made with sample cases shall be fired from a M101A1, M102, M119A1, or similar 105mm Howitzer approved by the Air Force Program Office. The cartridge shall be temperature conditioned at 70° F for a minimum of 12 hours, and then fired in a serviceable weapon. The projectiles may be fired into a berm or other catch device. Remote firing is permitted. The Firing Record (test report) shall include the model and lot or serial number for all weapon and ammunition components used in support of this test; details/evidence of any chamber incompatibility, extraction problems, obturation failures, un-soundness, sidewall cracks, and/or primer retention problems.

GUN TEST MATRIX (FAAT & LAT)			
Requirement	Paragraph	Failures	
		Accept	Reject
Chamber Compatibility	3.2.3.1	0	1
Extraction	3.2.3.2	0	1
Obturation	3.2.3.3	0	1
Soundness (Except Sidewall Cracks)	3.2.3.4	0	1
Sidewall Cracks Within 4 in of the Head	3.2.3.4	0	1
All Other Sidewall Cracks	3.2.3.4	1	2
Primer Retention	3.2.3.5	0	1

Table 4. Gun Test Pass/Fail Criteria

4.2.3.1. Chamber Compatibility. Inability to chamber the cartridge (due to cartridge case size or shape) without the use of tools shall be cause for rejection. Should a cartridge fail to chamber, further inspection and/or measurement is required to determine if the failure to chamber is due to case non-conformity, projectile (including rotating band) non-conformity, or case/projectile misalignment.

4.2.3.2. Extraction. The requirement to use tools to extract the fired case from the gun chamber shall be cause for rejection.

4.2.3.3. Obturation. Visually inspect for propellant gas migration. Evidence of propellant gas migration beyond the forward most four inches of the exterior of the case after firing shall be cause for rejection.

4.2.3.4. Soundness. Visually inspect the fired cartridge case for signs of material failure. Sidewall stretching and bulging is not considered a defect unless it results in the need for tools to extract the case from the chamber. A single split in the sidewall within four in. of the case head shall be cause for rejection. More than one sidewall split shall be cause for rejection. If a cartridge case breaks up, attempt to recover all pieces for examination, and inspect the gun bore. **WARNING** - Do not fire again if there is metal debris in the bore.

4.2.3.5. Primer Retention. Examine the base of the case and the primer. A loose primer (forced out of the cartridge case to the extent that it is no longer held by the cartridge case) shall be cause for rejection. Evidence that propellant gas migrated around the primer is also cause for rejection.

4.2.4. Bullet Pull Test. Depending upon the Load, Assemble, and Pack (LAP) contract for which the cases are to be used, the sample cases shall be crimped to the appropriate projectile type (HE, HF HE or Practice). The security of the crimp of the cartridge case to the projectile shall be determined by applying a load in the axial direction with a rate of travel of the testing machine head of 0.100 to 0.125 inch per minute. Compute average force ($\bar{x}$) and standard deviation (s) using the (n-1) formula. When M1-type projectiles are used (PGU-43/B or PGU-44/B Cartridges w/Refurb Projectile – see Table 5) compute k_L = ($\bar{x}$ - 860) / s. Reject the lot if k_L is less than 1.58, or if any individual bullet pull is less than 860 pounds. When HF M1-type projectiles are used (PGU-45/B Cartridge or PGU-44/B w/New Projectile – see Table 5) compute k_L = ($\bar{x}$-950) / s. Reject the lot if k_L is less than 1.58, or if any individual bullet pull is less than 950 pounds.

BULLET PULL TEST REQUIREMENT		
PROJECTILE ASSEMBLY	CARTRIDGE	MINIMUM PULL FORCE
9926073	PGU-43/B PRACTICE - 9926070	860 lbs
20039981 (New)	PGU-44/B HE	950 lbs
20039982 (Referb M1)	PGU-44/B HE	860 lbs
20039984	PGU-45/B	950 lbs

Table 5. Minimum Allowable Bullet Pull Force

4.2.5 Hardness Test. Section the cartridge case through the center of the head. Take six (6) hardness readings – three equally spaced through the head on each side of the primer hole as shown in Figure 1. The hardness readings shall be made in accordance with the procedures prescribed by ASTM-E18.

4.2.6. Tensile Strength Test. The test specimens shall be taken from the cartridge case as indicated in Figure 2. The tensile strength shall be determined in accordance with the procedures prescribed by ASTM-E8. For specimen A (see Table 2), readings below 44,000 psi or above 58,000 shall be cause for rejection. For specimens B,C, D, and E, reading below the appropriate minimum listed in Table 2 shall be cause for rejection.

4.2.7. Mercurous Nitrate Test. The mercurous nitrate test shall be performed as specified in ASTM-B154.

4.2.8 Macro Examination. The cartridge case shall be sectioned through the center of the head, polished and examined for folds and cold shuts in the radius area of the head (See Figure 3) in accordance with the procedures prescribed by ASTM-E340.

4.3 Quality Assurance. Analyses, inspections, examinations, and tests to insure conformance with requirements are specified in Table 6, Conformance Inspections. The contractor's quality program or detailed inspection system shall provide assurance of compliance of all characteristics with the applicable drawing and specification requirements. When cited herein, attributes sampling inspection shall be conducted in accordance with MIL-STD-1916, using the inspection levels cited in Table 6. Definitions of Critical, Special, Major, and Minor shall be as defined if MIL-STD-1916 and paragraph 6.11. Acceptance criteria shall be in accordance with MIL-STD-1916. Alternative conformance inspections may be submitted and approved in accordance with MIL-STD-1916. The Government reserves the right to observe or perform any of the inspections set forth in this specification.

4.4 Metal Defects. (Critical) Visual inspection and/or a non-destructive inspection (NDI) method such as ultrasonic inspection shall be employed. Presence of any of the defects listed in 3.4 shall be cause for rejection. In case of any failure, notify the Air Force Program Office and retain the rejected case for failure analysis.

4.5 Maximum Profile. Failure of any cartridge to freely (more than 15 pounds dead load required) enter Chamber Gage # 7555278 (or a similar one approved by the Air Force Program Office) shall be cause for rejection. In case of any failure, notify the Air Force Program Office and retain the rejected case for failure analysis.

4.6 Workmanship. Visually Inspect cases for evidence of poor workmanship.

5. PACKAGING. Packaging requirements shall be as specified in the contract.

CONFORMANCE INSPECTIONS				
CLASSIFICATION	EXAMINATION OR TEST	CONFORMANCE CRITERIA	REQUIREMENT PARAGRAPH	INSPECTION METHOD
CRITICAL				
1	Diameter & Taper of Primer Hole	100%	3.1	AIE
2	Defects in Metal	100%	3.4	Visual & AIE
SPECIAL				
1	Maximum Profile	100%	3.5	AIE
MAJOR				
101	True Position of Primer Hole with Body Basic Diameter	Level IV	3.1	AIE
102	True Position of Primer Counter Bore with Primer Hole	Level IV	3.1	AIE
103	Diameter of Flange, Minimum	Level IV	3.1	AIE
104	Diameter of Mouth	Level IV	3.1	AIE
105	Length From Primer Hole Counter Bore to Forward Surface of Flange, Minimum	Level IV	3.1	AIE
106	Thickness of case Wall at Mouth	Level IV	3.1	AIE
107	Thickness of case Wall at Basic Length	Level IV	3.1	AIE
108	Length of Flange, Minimum	Level IV	3.1	AIE
109	Length of Head, Minimum	Level IV	3.1	AIE
110	Inside Contour Between Head and Side Walls Not Smooth	Level IV	3.1	Visual
111	Diameter of Primer Hole Counter Bore	Level IV	3.1	AIE
112	Depth of Primer Hole Counter Bore	Level IV	3.1	AIE
113	Total Length	Level IV	3.1	AIE
MINOR				
201	Length to Basic Diameter Near Mouth, Minimum	Level II	3.1	AIE
202	Length to Basic Diameter Near Mid-Body, Minimum	Level II	3.1	AIE
203	Length to Basic Diameter Near Head, Minimum	Level II	3.1	AIE
204	Radii or Chamfers Missing or Incorrect	Level II	3.1	Visual
205	Improper Surface Finish	Level II	3.1	Visual
206	Burr	Level II	3.6	Visual
207	Foreign Matter	Level II	3.6	Visual
208	Evidence of Poor Workmanship	100%	3.6	Visual

Table 6. Conformance Inspections

6. NOTES. This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.

6.1 Intended Use. The CYU-1/B Cartridge Case covered by this specification is intended for use in producing Air Force 105mm cartridges to be fired from AC-130 Gunships. The cases will be assembled with M28 Primer Assemblies and M67 Propelling Charges (or approved equivalent). The case assembly will then be crimped to M1-type projectiles (PGU-43/B or PGU-44/B Cartridge) or HF M1-type projectiles (PGU-45/B Cartridge and PGU-44/B Cartridge with new projectiles). The cartridge cases covered by this specification are military unique because they are used for aircraft ammunition only and have no commercial application.

6.2 Acquisition requirements. Acquisition documents must specify the following :

a. Title, number and date of this specification.

b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2.1 and 2.3).

c. Packaging requirements.

d. Requirements for submission of first article sample (see 4.2).

e. Government Furnished Equipment.

f. Requirements for submittal of Acceptance Inspection Equipment (see 6.3).

g. Requirements for ammunition lot numbering and submission of ammunition data cards (see 6.4).

h. Requirements for approval of defect standards (see 6.5).

6.3 Submission of Inspection Equipment Design for Approvals. All designs as required are to be submitted to OO-ALC/WMBA, 6033 Elm Lane, Hill AFB, UT 84056-5819. Submissions may be in electronic format.

6.4 Submission of Gun Test Data and Ammunition Data Cards. Copies of all gun test data and ammunition data cards shall be forwarded to the Air Force program office: OO-ALC/WMBA, 6033 Elm Lane, Hill AFB, UT 84056-5819. Submissions may be in electronic format.

6.5 Defect standards. Defect standards must be approved by the Air Force program office.

6.6 Drawings. Drawings listed in section 2 of this specification under the heading U.S. Army Armament Research Development and Engineering Center (ARDEC) may also include drawings prepared by, and identified as U.S. Army Armament, Research and Development

Command (ARRADCOM), Frankfort Arsenal, Rock Island Arsenal or Picatinny Arsenal drawings. Technical data originally prepared by these activities is now under the cognizance of ARDEC.

6.7 Gun Test Sample. Having the gun test sample represent each day's production will help verify process control throughout the lot. As a minimum at least one sample should be taken per day and the balance taken from the last day of production.

6.8 Tensile Strength. It is not implied that cartridge cases that meet the minimum strength values specified will function satisfactorily in ballistic test.

6.9 Tool Design Dimensions. Dimensions marked as advisory dimensions for tool manufacturing need not be gauged on the product. The radii in the internal profile of the case are not critical and should be fixed to facilitate the flow of metal hence assuring the proper hardness.

6.10 Process notes. The following notes are provided for information only:

a. Processing should assure that mechanical properties specified on the applicable drawings are uniform throughout each section.

b. Processing should ensure the entire cartridge case is thermally treated after the heading operation.

c. Processing should include adequate stress relief at the times and temperatures suitable for development of desired properties.

6.11 Definitions.

a. Burn-through. Burn-through is an undesirable condition that is caused by the propellant gases eroding through the wall of the cartridge case. It is possible to see visual evidence of burn-through on the exterior wall of the cartridge case after firing, since the gases leave a smudge on that surface.

b. Blow-back. Blow-back is an undesirable condition that is caused by a poor seal at the primer interface. When the propelling charge is ignited, hot gases pass through a poor seal and leave burn marks on the exterior surface at the primer interface. These marks may also be visible on the breech of the weapon.

c. Obturation. Obturation is a desirable condition in a cartridge case. It is the expansion of the case sidewall to conform to the chamber of the weapon in the area of case/chamber interface. The expanding propellant gases cause the expansion. Obturation provides the necessary seal so that the projectile may reach the desired velocity to make range. Poor obturation is evidenced by gas erosion and smudging by propellant gases on the exterior of the cartridge case after firing.

d. Inspection Lot. A homogeneous collection of units of product from which a representative sample is drawn or which is inspected 100 percent to determine conformance

with applicable requirements. Units of product selected for inspection shall represent only the inspection lot from which they are drawn and shall not be construed to represent any prior or subsequent quantities presented for inspection. Homogeneity shall be considered to exist provided the inspection lot has been produced by one manufacturer, in one unchanged process, using the same materials and methods, in accordance with the same drawings, same drawing revisions, same specifications and same specification revisions. The size of inspection lots may differ from the quantities contractually scheduled for delivery.

e. Acceptance Inspection Equipment (AIE). Any measuring device that is traceable to the national or international standard used to assure conformance of material to the contract requirements.

f. Special Characteristic. Special characteristics are those attributes, other than critical, that in the event of a nonconformance may (depending upon the degree of divergence from requirements, the presence of other nonconformance or procedural errors) result in hazardous or unsafe conditions. Depending upon the degree of divergence from the requirement the defect may be classified as critical or major and require the appropriate corrective actions.